JMS mode of Operation

…… getting more out of your Quad-AMS

What is JMS mode?
What benefits can I get?
Drawbacks?
Analysis software

What is it?

MS mode…….
Continuous scan from m/z x to m/z y
Resolution 0.05 amu
Each point gets 1ms scan time per cycle

JMS mode…….(ask jose for the details)
Discontinuous scan at selected m/z’s.
Scan at a single points within the m/z range.
Position of scan same as used in TOF mode.
Each point/m/z gets approx 55ms per cycles.
Benefits of JMS mode

Error = 1 / sqrt ( sample time )…….

So a large fractional increase in sample time greatly reduces errors and increases signal to noise.

This allows an increase in time resolution for the AMS to allow increased high speed info on key mass.

This can be exploited to increase sensitivity in mass time series.
Drawbacks of JMS mode

Less time spent in MS and TOF mode… organics suffers most heavily but highly sensitive m44 etc

Can't scan too many masses (or little benefit gained)

Some software issues (hopefully now fixed)

All JMS need scaling up to match MS data (m/z dependent correction)

Analysis software

New version with key bugs removed
Loading data

No real changes.........

Mass axis waves

Stick Diff/Avg data for each m/z

Stick Open/closed data for each m/z

Raw diff/avg data for each m/z

Raw open/closed data for each m/z

Calculating corrections

Do what you want but calculate error is desirable!
Import the JMS data

- m/z list which is scanned
- List of m/z to import...
- List of m/z to revert...
- Diff or avg data?
- Diagnostics for specifics m/z
- JMS -> MS data
- Infer other SO4 m/z’s not in JMS scan
- Insert a “break point” for ratio calculation
- Basic graphing utilities

Diagnostics
Use SO4 frag characteristics

A nice application
Particle size is derived from the flight time of particles in the vacuum region, this varies as a function of pressure and needs to be corrected post flight:

\[ v_p = \frac{v_g - v_f}{1 + (D_a/D_s)^9} + v_f \]

Expand all terms \( v_g = v_g1 + v_g2 \cdot P \)
Aircraft again

Particle diameter
Pressure

Particle velocity

Application of Calibration to PSL’s

Particle Diameter (nm)
600 mBar

Particle Diameter (nm)
800 mBar

Particle Diameter (nm)
1000 mBar